IN THE CLAIMS:

Please substitute the following claims for the previous claims:

1. (previously presented) A substrate etching apparatus comprising:

(a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) one or more detectors to (i) detect an intensity of a first radiation originating from the radiation source and reflected from the substrate or a chamber wall and generate a sample signal, and (ii) detect an intensity of a second radiation emitted from the radiation source and generate a reference signal; and

(c) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal to compensate for both (i) a fluctuation in the reflected radiation that originates from the radiation source and (ii) background radiation that is not from the radiation source,

whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

2. (previously presented) An apparatus according to claim 1 wherein the detectors are adapted to detect substantially the same wavelength of the first and second radiation.

3. (previously presented) An apparatus according to claim 1 wherein the detectors are adapted to detect a wavelength of the first and second radiation that is suitable to determine an endpoint of the process.

4. (previously presented) An apparatus according to claim 1 comprising a first detector to detect the intensity of the first radiation and a second detector to detect the intensity of the second radiation.

5. (cancelled)

6. (previously presented) An apparatus according to claim 1 wherein the signal analyzer normalizes the reference and sample signals by determining a ratio of the signals.

7. (original) An apparatus according to claim 6 wherein the signal analyzer is adapted to determine a corrected sample signal by applying a correction factor to the normalized signal.

8. (previously presented) An apparatus according to claim 7 wherein the signal analyzer determines the corrected sample signal, X_{nt}, using the expression $X_{nt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is the correction factor, Y_0 is the reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

9. (original) An apparatus according to claim 8 wherein the signal analyzer determines the correction factor using the equation $C = \{Y_0(X_t - X_1)\}/\{X_1(Y_t - Y_0)\}$, where X_1 is the sample signal at time 1.

10. (original) An apparatus according to claim 8 wherein the signal analyzer determines the correction factor by the equation $C = X_0 / X_1$; where X_0 is the sample signal at time 0; and X_1 is the sample signal at time 1.

11. (original) An apparatus according to claim 4 further comprising a radiation pathway capable of transmitting the second radiation from the radiation source to the second detector.

12. (original) An apparatus according to claim 11 wherein the radiation pathway is in a radiation transmitting fiber.

13. (original) An apparatus according to claim 12 wherein the radiation transmitting fiber comprises an optical fiber.

14. (original) An apparatus according to claim 1 wherein the radiation source comprises a lamp, light emitting diode, laser, or a radiation emission from a plasma in the chamber.

15-22. (cancelled)

23. (previously presented) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal; and

(c) a signal analyzer to receive the sample signal and determine a corrected sample signal, X_{nt}, using the expression $X_{nt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is a correction factor, Y_0 is a reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

24. (original) An apparatus according to claim 23 wherein the signal analyzer determines the correction factor using the equation $C = \{Y_0(X_t - X_1)\}/\{X_1(Y_t - Y_0)\}$; where X_1 is the sample signal at time 1.

25. (original) An apparatus according to claim 23 wherein the signal analyzer determines the correction factor using the equation $C = X_0 / X_1$; where X_0 is the sample signal at time 0; and X_1 is the sample signal at time 1.

26. (previously presented) An apparatus according to claim 23 wherein the detector is adapted to detect a radiation originating from the radiation source and generate the reference signal, and wherein the signal analyzer is adapted to receive the reference signal and determine a normalized signal from the sample and reference signals.

27. (original) An apparatus according to claim 26 wherein the signal analyzer determines the normalized signal by calculating a ratio of the sample and reference signals.

28. (original) An apparatus according to claim 23 further comprising a radiation pathway capable of transmitting radiation from the radiation source to the reference detector.

29. (original) An apparatus according to claim 28 wherein the radiation pathway is in one or more fibers.

30. (previously presented) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

(c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal;

(d) one or more first fibers to transmit the reference radiation from the radiation source to the reference detector and one or more second fibers to transmit radiation from the radiation source to the chamber, the first and second fibers arranged to individually receive radiation from the same spatial area of the radiation source; and

(e) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal with the reference signal to generate a normalized signal, and determine a thickness of a layer being etched on the substrate or chamber wall from the normalized signal.

31-32. (cancelled)

33. (previously presented) An apparatus according to claim 30 wherein the areas are from the same region of the radiation source.

34. (previously presented) An apparatus according to claim 30 wherein the first and second fibers are arranged to have substantially overlapping fields of view.

35. (previously presented) An apparatus according to claim 30 wherein the first fibers lead directly from the radiation source to the reference detector.

36. (previously presented) An apparatus according to claim 30 further comprising a lens to focus the r ference radiation from the radiation source onto the first fibers.

37. (previously presented) An apparatus according to claim 30 further comprising a signal analyzer to receive the reference and sample signals and normalize the sample signal relative to the reference signal to generate a normalized signal by mathematically operating on the sample signal with the reference signal, and determine a thickness of a layer being etched on the substrate or chamber wall from the normalized signal.

38. (previously presented) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas into a plasma, a gas exhaust to exhaust gas from the chamber, and a radiation source other than a plasma in the chamber;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

(c) a first reference detector to detect a first reference radiation from the plasma and generate a first reference signal, wherein the first reference radiation comprises a background radiation;

(d) a second reference detector to detect a second reference radiation from the radiation source and generate a second reference signal; and

(e) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal to compensate for both (i) the background radiation from the plasma and (ii) a fluctuation in the reflected radiation,

whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

39. (previously presented) An apparatus according to claim 38 wherein the fibers receive reference radiation that is viewed from the side of the plasma, or that is viewed from an angle which is not from directly above the substrate.

40. (previously presented) A substrate etching apparatus comprising:

(a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source other than a plasma in a process zone in the chamber;

(b) one or more detectors to detect an intensity of a first radiation reflected from the substrate or a chamber wall to determine a thickness of a layer on the substrate or chamber wall, and detect an intensity of a second radiation from the radiation source; and

(c) a feedback controller to regulate a power level of the radiation source in relation to the detected intensity of the second radiation.

41. (original) An apparatus according to claim 40 wherein the feedback controller is adapted to control a power supply that powers the radiation source.

42. (previously presented) An apparatus according to claim 40 wherein the feedback controller is adapted to maintain the intensity of the second radiation at a substantially constant level.

43. (cancelled)

44. (previously presented) A substrate etching apparatus comprising:

(a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber;

(b) a radiation source capable of generating a radiation;

(c) a first detector to detect a property of the radiation from the radiation source and generate a reference signal in relation to the property;

(d) a radiation modulator in a path of a radiation being transmitted from the radiation source to the chamber, the radiation modulator being adapted to receive the reference signal and control a property of the radiation in relation to the reference signal; and

(e) a second detector in a path of the radiation, the second detector capable of detecting an intensity of the radiation reflected from the substrate or a chamber wall to determine a thickness of a layer being etched on the substrate or chamber wall.

45. (previously presented) An apparatus according to claim 44 wherein the first detector is adapted to detect a property of the radiation comprising one or more of an intensity, phase or wavelength.

46. (original) An apparatus according to claim 44 wherein the radiation modulator is adapted to regulate an intensity of the radiation.

47. (previously presented) An apparatus according to claim 46 wherein the radiation modulator is adapted to maintain the intensity of the radiation at a constant level.

48. (previously presented) An apparatus according to claim 46 wherein the radiation modulator comprises a shutter, mirror, or variable density screen.

49. (previously presented) An apparatus according to claim 46 wherein the radiation modulator comprises a means for partially attenuating the radiation.

50. (original) An apparatus according to claim 44 wherein the radiation modulator comprises an electro-optical or acoustic-optical transducer.

51. (previously presented) An apparatus according to claim 44 wherein the radiation is transmitted to the first detector by one or more radiation transmitting fibers.

52-56. (cancelled)

57. (previously presented) A substrate etching apparatus comprising:

a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

one or more detectors to detect an intensity of a radiation reflected from the substrate or a chamber wall to generate a sample signal that may be used to determine a thickness of a layer being etched on the substrate or chamber wall, and to detect a property of a radiation from the radiation source and generate a reference signal in relation to the property; and

a feedback controller to regulate a power level of the radiation source in relation to the reference signal.

58. (original) An apparatus according to claim 57 wherein the feedback controller is adapted to control a power supply that powers the radiation source.

59. (original) An apparatus according to claim 57 wherein the detector is adapted to detect a property of the radiation comprising one or more of an intensity, phase or wavelength.

60. (previously presented) An apparatus according to claim 40 wherein the one or more detectors generate a sample signal from the detected intensity of the first radiation and generate a reference signal from the detected intensity of the second radiation, and wherein the apparatus comprises a signal analyzer to normalize the sample signal relative to the reference signal to generate a normalized signal by mathematically operating on the sample signal with the reference signal, and determine a thickness of a layer on the substrate or chamber wall from the normalized signal.

61. (currently amended) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

(c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal; and

(d) a signal analyzer adapted to normalize the sample signal to compensate for both (i) a fluctuation in the reflected radiation from the radiation source and (ii) background radiation that is not from the radiation source by:

~~(a)~~ (1) before the gas energizer energizes the etchant gas, measuring the sample and reference signals,

~~(b)~~ (2) after the gas energizer energizes the etchant gas but before substantially etching has occurred, measuring the sample signal, and

~~(c)~~ (3) during etching, measuring the sample and reference signals,

whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

62. (previously presented) An apparatus according to claim 1 wherein (i) the radiation source comprises one or more of a lamp, laser source, or light-emitting diode, and wherein (ii) the background radiation comprises one or more of ambient plasma radiation, species emission charges, and plasma brightness variations.

63. (currently amended) An apparatus according to claim 1, wherein the signal analyzer comprises a signal analyzer to normalize the sample signal by:

~~(a)~~ (1) before the gas energizer energizes the etchant gas, measuring the sample and reference signals,

~~(b)~~ (2) after the gas energizer energizes the etchant gas and before substantial etching has occurred, measuring the sample signal, and

~~(c)~~ (3) during etching, measuring the sample and reference signals.